AMENDMENTS TO THE CLAIMS

1. (Original) A computer input device, comprising:

an electronic imager positioned to create images of portions of a surface moving relative to the imager;

an illumination source positioned to illuminate the portions of the surface imaged by the imager; and

at least one controller coupled to the imager and the illumination source and configured to:

selectively activate the illumination source,

receive the images from the imager,

determine, based on at least some of the images, an imager velocity relative to the surface,

activate the illumination source at one of at least three activation rates when the imager is moving relative to the surface and imager velocity is being determined, and

select one of the at least three activation rates based at least in part upon the imager velocity.

2. (Original) The computer input device of claim 1, wherein the computer input device is a battery-powered, optically-tracking computer mouse.

3. (Original) The computer input device of claim 1, wherein the controller is further configured to:

determine an imager acceleration relative to the surface, and

select the illumination source activation rate based on the imager velocity and the imager acceleration.

4. (Original) The computer input device of claim 1, wherein the controller is configured to select the activation rate by selecting a rate $F_{prediction}$ based on the equation $F_{prediction} = F(V_{margin})$, wherein:

F( ) is a function mapping to a velocity V the minimum frame rate necessary to accurately determine that velocity,

$$V_{margin} = \begin{cases} (1+m) * V_{prediction}, & \text{if greater than } V_{min}, \text{ and} \\ V_{min} & \text{otherwise,} \end{cases}$$

m = a constant,

V_{min} = a minimum frame rate supported by the device.

$S_0 = V_0$,

V_0 = current velocity,

$A_0 = (V_0/|V_0|)*(V0-V_{-1})$,

V_{-1} = a previous velocity, and

$$V_{prediction} = \begin{cases} |S_0 + A_0|, & \text{if } A_0 > 0, \text{ and} \\ |S_0| & \text{if } A_0 < 0. \end{cases}$$

5. (Original) The computer input device of claim 3, further comprising a memory having at least one user profile parameter stored thereon, and wherein the controller is further configured to vary the illumination source activation rate based on the imager velocity, the imager acceleration and the at least one user profile parameter.

6. (Original) The computer input device of claim 2, further comprising a proximity detector, and wherein the controller is further configured to vary the illumination source activation rate between a reduced standby rate and one of the at least three rates based at least in part on an output of the proximity detector.

7. (Original) The computer input device of claim 2, wherein the controller is further configured to vary the illumination source activation rate between a reduced standby rate and one

of the at least three rates based at least in part on a signal from an external source, said signal indicating the illumination source activation rate should be reduced.

8. (Currently Amended) A computer input device, comprising:

an electronic imager positioned to create images of portions of a surface moving relative to the imager;

an illumination source positioned to illuminate the portions of the surface imaged by the imager; and

at least one controller coupled to the imager and the illumination source and configured to:

selectively activate the illumination source,

receive the images from the imager,

determine, based on a first set of images received from the imager, an imager velocity relative to the surface and relative to one of three predetermined velocity levels, and

estimate an imager displacement relative to the surface based on the imager velocity and an elapsed time since movement from a position corresponding to one or more of the images of the first set.

9. (Original) The computer input device of claim 8, wherein the computer input device is a battery-powered, optically-tracking computer mouse.

10. (Original) The computer input device of claim 8, wherein the controller is further configured to:

determine, based on the first set of images, an imager acceleration relative to the surface,

determine, based on at least one of the imager velocity and the imager acceleration, a time Δt, and

estimate imager displacement relative to the surface at each of a plurality of times during Δt, wherein each of said estimates is based on the imager velocity and a different amount

of time elapsed since movement from a position corresponding to one or more of the images of the first set.

11. (Original) The computer input device of claim 10, wherein the controller is further configured to:

determine a revised imager velocity and revised imager acceleration based on a second set of images created subsequent to the expiration of Δt,

determine a revised time period $\Delta t'$ based on at least one of the revised velocity and the revised acceleration, and

estimate imager displacement relative to the surface at each of a second plurality of times during $\Delta t'$, wherein each of said estimates is based on the revised imager velocity and a different amount of time elapsed since movement from a position corresponding to one or more of the images of the second set.

12. (Original) The computer input device of claim 10, wherein the controller is further configured to:

determine a revised imager velocity and revised imager acceleration based on a second set of images created subsequent to the expiration of Δt,

determine whether a velocity value based on the revised imager velocity is above a threshold velocity and whether an acceleration value based on the revised imager acceleration is below a threshold acceleration, and

upon determining that either the velocity value is not above the threshold velocity or the acceleration value is not below the threshold acceleration, determine imager displacement based on images of overlapping portions of the surface.

13. (Original) The computer input device of claim 12, wherein the velocity value is the revised imager velocity and the acceleration value is the revised imager acceleration.

14. (Original) The computer input device of claim 12, wherein:

the revised imager velocity is a velocity of the imager along an axis,

the revised imager acceleration is an acceleration along the axis,

the velocity value is a composite of the revised imager velocity and a velocity along an orthogonal axis, and

the acceleration value is a composite of the revised imager acceleration and an acceleration along the orthogonal axis.

15. (Original) The computer input device of claim 12, wherein the controller is further configured, during periods when the velocity value is not above the threshold velocity or the acceleration value is not below the threshold acceleration, to:

determine subsequent imager velocities relative to the surface,

increase a rate of illumination source activation based on an increase in the subsequent imager velocities, and

decrease the rate of illumination source activation based on a decrease in the subsequent imager velocities.

16. (Original) The computer input device of claim 10, further comprising a memory having a preset time value stored therein, and wherein the controller is further configured to:

determine a revised imager velocity and revised imager acceleration based on a second set of images created subsequent to the expiration of Δt,

determine whether a velocity value based on the revised imager velocity is above a threshold velocity and whether an acceleration value based on the revised imager acceleration is below a threshold acceleration, and

upon determining that the velocity value is below the threshold velocity and the acceleration value is above the threshold acceleration, cease estimating the imager displacement for a time period equal to the preset time value.

17. (Original) The computer input device of claim 10, further comprising a memory having at least one user profile parameter stored thereon, and wherein the controller is further

configured to vary the manner in which the time Δt is determined based at least in part on said parameter.

18. (Original) A computer-readable medium having stored thereon data representing sequences of instructions which, when executed by a processor, cause the processor to perform steps comprising:

selectively activating an illumination source positioned on a computer input device;

receiving from an imager sets of data indicative of portions of a surface illuminated by the illumination source;

determining, based on at least some of the received data sets, an imager velocity relative to the surface;

activating the illumination source at one of at least three activation rates when the imager is moving relative to the surface and imager velocity is being determined; and

selecting one of the at least three activation rates based at least in part upon the imager velocity.

19. (Original) The computer-readable medium of claim 18, comprising additional data representing sequences of instructions which, when executed by a processor, cause the processor to perform additional steps comprising:

determining an imager acceleration relative to the surface; and

selecting the illumination source activation rate based on the imager velocity and the imager acceleration.

20. (Original) The computer-readable medium of claim 18, wherein said selecting one of the at least three activation rates comprises selecting a rate $F_{prediction}$ based on the equation $F_{prediction} = F(V_{margin})$, wherein:

F( ) is a function mapping to a velocity V the minimum frame rate necessary to accurately determine that velocity,

$$V_{margin} = \begin{cases} (1+m) * V_{prediction}, & \text{if greater than } V_{min}, \text{ and} \\ V_{min} & \text{otherwise,} \end{cases}$$

m = a constant,

V_{min} = a minimum frame rate supported by the device.

$S_0 = V_0$,

V_0 = current velocity,

$A_0 = (V_0/|V_0|)*(V0-V_{-1})$,

V_{-1} = a previous velocity, and

$$V_{prediction} = \begin{cases} |S_0 + A_0|, & \text{if } A_0 > 0, \text{ and} \\ |S_0| \text{ if } A_0 < 0. \end{cases}$$

21. (Currently Amended) A computer-readable medium having stored thereon data representing sequences of instructions which, when executed by a processor, cause the processor to perform steps comprising:

selectively activating an illumination source positioned on a computer input device;

receiving from an imager groups of data sets, the data sets indicative of portions of a surface illuminated by the illumination source;

determining, based on a first group of received data sets, an imager velocity relative to the surface and relative to one of three predetermined velocity levels; and

estimating an imager displacement relative to the surface based on the imager velocity and an elapsed time since movement from a position corresponding to one or more of the datasets of the first group.

22. (Original) The computer-readable medium of claim 21, comprising additional data representing sequences of instructions which, when executed by a processor, cause the processor to perform additional steps comprising:

determining, based on the first group of data sets, an imager acceleration relative to the surface;

determining, based on at least one of the imager velocity and the imager acceleration, a time Δt; and

estimating imager displacement relative to the surface at each of a plurality of times during Δt, wherein each of said estimates is based on the imager velocity and a different amount of time elapsed since movement from a position corresponding to one or more of the data sets of the first group.

23. (Original) The computer-readable medium of claim 22, comprising additional data representing sequences of instructions which, when executed by a processor, cause the processor to perform additional steps comprising:

determining a revised imager velocity and revised imager acceleration based on a second group of received data sets, the second group of received data sets being created subsequent to the expiration of Δt;

determining a revised time period $\Delta t'$ based on at least one of the revised velocity and the revised acceleration; and

estimating imager displacement relative to the surface at each of a second plurality of times during $\Delta t'$, wherein each of said estimates is based on the revised imager velocity and a different amount of time elapsed since movement from a position corresponding to one or more of the data sets of the second group.

24. (Original) The computer-readable medium of claim 22, comprising additional data representing sequences of instructions which, when executed by a processor, cause the processor to perform additional steps comprising:

determining a revised imager velocity and revised imager acceleration based on a second group of received data sets, the second group of received data sets being created subsequent to the expiration of Δt;

determining whether a velocity value based on the revised imager velocity is above a threshold velocity and whether an acceleration value based on the revised imager acceleration is below a threshold acceleration; and

upon determining that either the velocity value is not above the threshold velocity or the acceleration value is not below the threshold acceleration, determining imager displacement based on additional received data sets indicative of overlapping surface portions.

25. (Original) The computer-readable medium of claim 24, wherein the velocity value is the revised imager velocity and the acceleration value is the revised imager acceleration.

26. (Original) The computer-readable medium of claim 24, wherein:

the revised imager velocity is a velocity of the imager along an axis,

the revised imager acceleration is an acceleration along the axis,

the velocity value is a composite of the revised imager velocity and a velocity along an orthogonal axis, and

the acceleration value is a composite of the revised imager acceleration and an acceleration along the orthogonal axis.

27. (Original) The computer-readable medium of claim 24, comprising additional data representing sequences of instructions which, when executed by a processor, cause the processor to perform additional steps comprising:

determining, during periods when the velocity value is not above the threshold velocity or the acceleration value is not below the threshold acceleration, subsequent imager velocities relative to the surface;

increasing a rate of illumination source activation based on an increase in the subsequent imager velocities; and

decreasing the rate of illumination source activation based on a decrease in the subsequent imager velocities.

28. (Original) The computer-readable medium of claim 22, comprising additional data representing sequences of instructions which, when executed by a processor, cause the processor to perform additional steps comprising:

determining a revised imager velocity and revised imager acceleration based on a second group of received data sets, the second group of received data sets being created subsequent to the expiration of Δt;

determining whether a velocity value based on the revised imager velocity is below a threshold velocity and whether an acceleration value based on the revised imager acceleration is above a threshold acceleration; and

upon determining that the velocity value is below the threshold velocity and the acceleration value is above the threshold acceleration, ceasing estimation of the imager displacement for a time period equal to a preset time value stored upon the computer-readable medium.

29. (Original) The computer-readable medium of claim 21, wherein said selectively activating comprises selectively activating at least one of an edge-emitting laser, a vertical cavity surface emitting laser, and a light emitting diode.

30. (Original) A computer input device, comprising:

a sensor positioned to detect changes in a measurable parameter;

a power source; and

a controller coupled to the sensor and the power source, and configured to:

selectively activate the sensor,

receive data from the sensor,

determine, based upon the received data, a sensor velocity,

activate the sensor at one of at least three activation rates when the sensor velocity is being determined, and

select one of the at least three activation rates based at least in part upon the sensor velocity.

31. (Original) The computer input device of claim 30, further comprising an illumination source, and wherein:

the sensor is a light-sensitive imaging array, and

the received data comprises image data of a tracked surface movable with respect to the array.